

Secondary 3 Honors

Notes 4-3: Graphing Rational Expression, Day 3

**Warm-up:** Factor the following polynomials.

1.  $f(x) = x^2 + 6x + 9$

$= (x+3)^2$

2.  $f(x) = x^4 - 2x^3 - 8x^2$

$= x^2(x-4)(x+2)$

Find all the critical information and then graph the rational expression by hand.

1.  $f(x) = \frac{2x^2}{x+1}$

D:  $(-\infty, -1) \cup (-1, \infty)$

VA: VA @  $x = -1$  opp

H: NONE

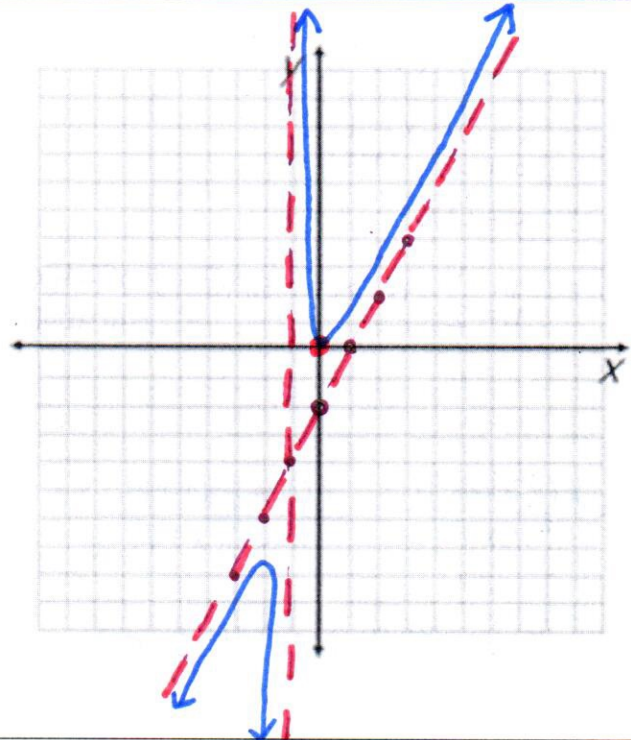
X:  $x = 0$  bounce

Y:  $y = 0$

EB:  $m=2$   $m > n$   
 $n=1$

SA @  $y = 2x - 2$

$$\begin{array}{r} 2x-2 \\ x+1 \overline{) 2x^2+0x+0} \\ \underline{-(2x^2+2x)} \phantom{0} \\ 2x+0 \\ \underline{-(2x-2)} \\ 2 \end{array}$$



2.  $f(x) = \frac{x^2 - x - 2}{x - 3}$

$\frac{(x-2)(x+1)}{(x-3)}$

D:  $(-\infty, 3) \cup (3, \infty)$

VA:  $x = 3$  opp

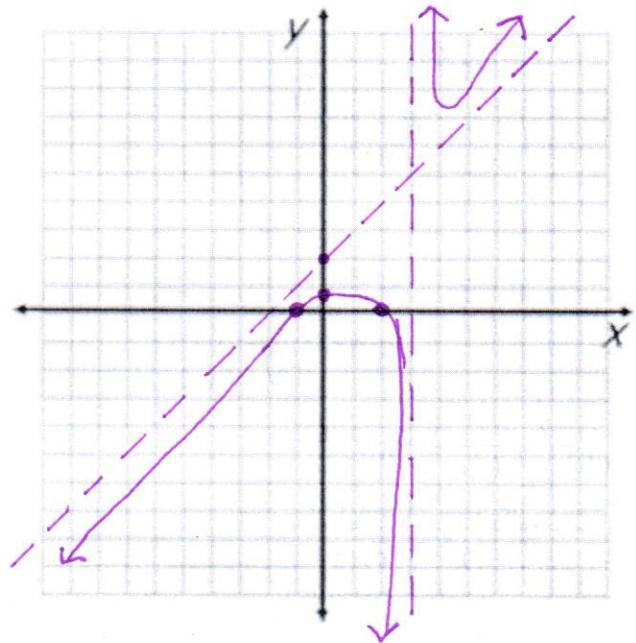
H: None

X:  $x = 2$ ,  $x = -1$   
cross cross

Y:  $y = 2/3$

EB:  $m=2$   $m > n$   
 $n=1$

SA @  $y = x + 2$



$$\begin{array}{r} x+2 \\ x-3 \overline{) x^2-x-2} \\ \underline{-(x^2-3x)} \phantom{0} \\ 2x-2 \\ \underline{-(2x-6)} \\ 4 \end{array}$$

$$3. f(x) = \frac{x^4 - 4x^3 + 3x^2}{x^2 - 9}$$

$$\frac{x^2(\cancel{x-3})(x-1)}{(\cancel{x-3})(x+3)}$$

$$D: (-\infty, -3) \cup (-3, 3) \cup (3, \infty)$$

$$VA: x = -3$$

opp

$$H: x = 3 \quad (3, 3)$$

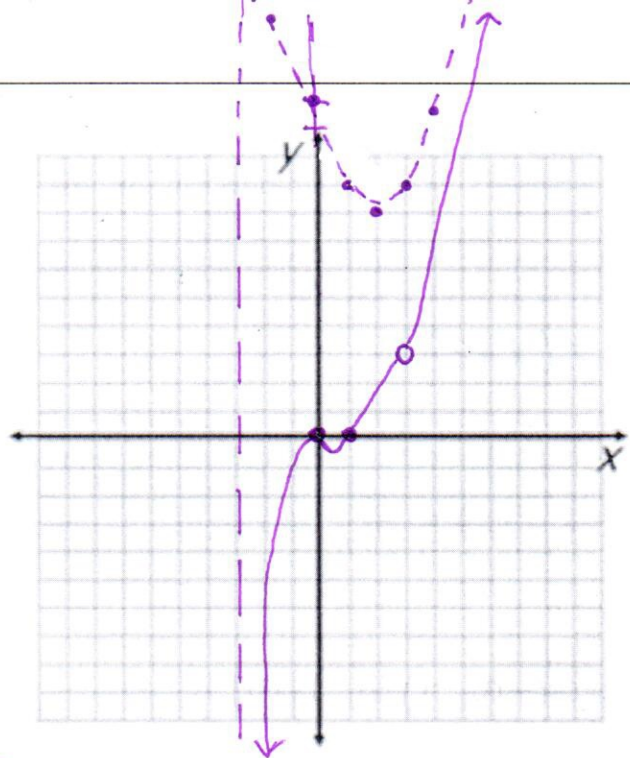
$$X: x = 0, \quad x = 1$$

bounce      cross

$$Y: y = 0$$

$$EB: m = 4 \quad n = 2 \quad m > n \quad SA @ y = x^2 - 4x + 12$$

parabola



$$4. f(x) = \frac{x^3 + 6x^2 + 9x}{x^2 + 5x + 6}$$

$$\frac{x(x^2 + 6x + 9)}{x^2 + 5x + 6} = \frac{x(\cancel{x+3})(x+3)}{(\cancel{x+3})(x+2)}$$

$$D: (-\infty, -3) \cup (-3, -2) \cup (-2, \infty)$$

$$VA: x = -2$$

opp

$$H: (-3, 0)$$

$$X: x = 0, \quad x = -3$$

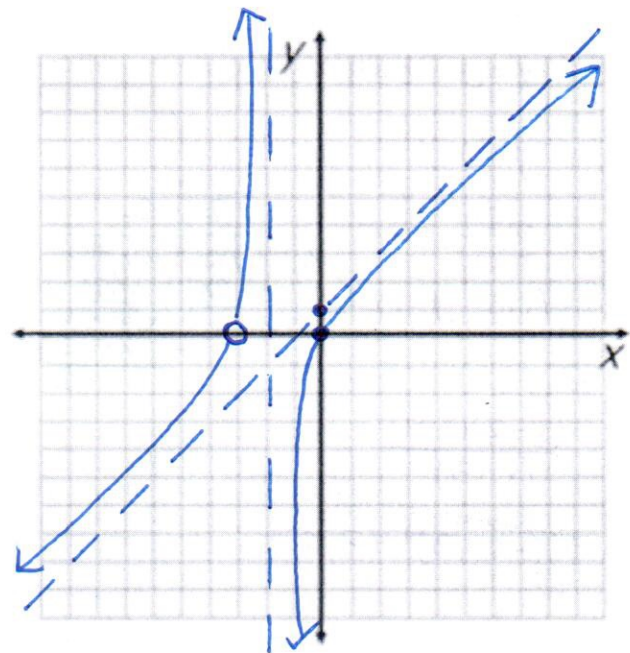
cross      cross

$$Y: y = 0$$

$$EB: m = 3 \quad n = 2 \quad m > n$$

SA @ y = x + 1

line



$$\begin{array}{r} x+1 \\ x^2+5x+6 \overline{) x^3+6x^2+9x+0} \\ \underline{-(x^3+5x^2+6x)} \phantom{+0} \\ x^2+3x+0 \\ \underline{-(x^2+5x+6)} \\ -2x-6 \end{array}$$